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ABSTRACT

The purpose of this study was to identify the beliefs of Tennessee principals and teachers about the knowledge and skills required of leaders when using data to improve educational decision-making. Personal interviews were conducted with 10 principals and 10 teacher leaders certified by the National Board for Professional Teaching Standards. Subjects represented elementary, middle, and high schools from city and county school systems. Three general research questions were addressed in the hope of finding answers that would aid in the development of a new data analysis strand to be part of a redesigned Masters Degree program in educational leadership at East Tennessee State University. Responses to the first question indicated that there is great similarity in the data-related knowledge and skills needed by principals and teacher-leaders in the schools. Respondents were in agreement that the two groups needed to cultivate the same knowledge and skills while in preparation programs. Responses to the second question suggest that the knowledge and skills required for successful school leaders are aligned around seven primary areas: (1) the school improvement process; (2) types of assessment data; (3) managing data; (4) analyzing data and data quality; (5) using data to improve teaching and learning; (6) making data public; and (7) accountability issues. Responses to the third question indicate that the major criterion for a successful new program is that the activities designed to impact knowledge and skills be authentic and allow participants to use their places of work as laboratories. An appendix describes initial interview schedules. (Contains 13 references.) (SLD)

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Principals' and Teacher-Leaders' Beliefs About What School Leaders Need To Know Regarding Data and Its Use In Educational Decision-Making

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Introduction

"Yes, data analyses – it is everything! I mean right now in education, it is everything. I mean.....you've got to learn to get the data, figure out what you're going to do with it, analyze it, and come out with an actual plan that is related to it. I mean you have to---it is required !" **(Elementary School Principal)**

While this quote may slightly overstate the importance of data in today's schools, it may be closer to reality than many would think. Given the recent calls for greater accountability in public education, it is important that school leaders know how to make educational decisions that are based on school-based data and not simply intuition. In a recent report, however, Hoachlander, Alt, and Beltranena (2001) noted that "in many cases, the educational leaders of schools and school districts are not prepared to manage accountability effectively" (p.36). These authors suggested that school leaders need a better understanding of assessment data and how it can be used in schools to facilitate the school improvement process. The authors implied that traditional ways of preparing individuals for school leadership positions have not been effective and that, in particular, prior strategies for teaching about the use of data have not been on target. This general message is echoed in other recent reports (e.g., Bottoms & O'Neill, 2001; Murphy, Jff, & Shipman, 2000). It has also been argued that if school leaders are to use data effectively in educational decision-making, they must have a good understanding of testing and assessment concepts (McMillan, 2001) and basic statistical analysis (Creighton, 2001). These authors argue that by using structured learning experiences using "real" data, those studying to be school leaders can gain a working knowledge of testing and data analysis. Recent work as called for the use of data to make schools more equitable places and assure that school leaders can "use data tools and strategies to help defy a scenario where low-income students and students of color remain underachievers" (Johnson, 2002, p. 3). All of these converging themes can then be applied to the management of those data for decision-making purposes and ultimately, school improvement. As suggested by Bernhardt (1998):

> What separates successful schools from those that will not be successful in their reform efforts is the use of one, often neglected, essential element---data. Schools that analyze and utilize information about their school communities make better decisions about not only what to change, but how to institutionalize systemic change (p. 1).

These calls for the use of data in educational decision-making have been incorporated into a growing number of efforts to restructure or to reform school leadership preparation programs.

Background

During the 2001 academic year, the Department of Educational Leadership and Policy Analysis at East Tennessee State University began working on a plan to revise its principal preparation program. At that time it became a member of the Southern Regional Education Board's (SREB) University Leadership Development Network. The departmental vision for the new program is grounded in the standards of the Interstate School Leaders Licensure Consortium (Council of Chief State School Officers, 1996) and the standards for the preparation of school leaders adopted by the Tennessee, Virginia, and North Carolina State Departments of Education. One of the major goals of the program is to provide learning experiences that apply leadership and research-based knowledge to solving school-based problems. The program is to be structured around research-based, comprehensive school improvement designs adopted by districts and schools (ELPA, 2001). Much of the work of the team is based on the research-based information presented in two recent publications of the SREB, *Preparing a new breed of school principals: It's time for action* (Bottoms & O'Neill, 2001) and *Leading school improvement: What research says* (Hoachlander, Alt, & Beltranena, 2001). One of the key strategies for success outlined in *Leading school improvement: What research says* (Hoachlander, Alt, & Beltranena, 2001), is related to the school monitoring and accelerating improvement through assessment and accountability. The following challenge was issued to preparation programs in the following passage:

> In many cases, the educational leaders of schools are not prepared to manage accountability effectively. At least three issues require attention: 1) understanding assessment, its strengths, and its limitations; 2) knowing how to design and implement sound, data-driven evaluations to assess local school improvement; and 3) knowing how to transform traditional management information systems from administrative record-keeping to accessible, useable systems for school improvement (SREB, 2001b, p. 36)

The recommendations drawn from the SREB are consistent with the ISLLC standards (1996) and earlier calls for reform in principal preparation from the National Policy Board for Educational Administration through their publication *Principals for our changing schools: Knowledge and skill base* (NPBEA, 1993). Specifically, in Standard One, the ISLLC Standards call for administrators who have "knowledge and

understanding of information sources, data collection, and data analysis strategies" (Council of Chief State School Officers, 1996, p.10). Likewise, two of the specific "functional domains" identified in *Principals for our changing schools: Knowledge and skill base* (NPBEA, 1993) relate to "information Collection" (p. 2-1) and "measurement" (p.12-1).

The redesign efforts have also been informed, however, by the emergence of standards for those working to become accomplished teachers or teacher-leaders certified by the National Board for Professional Teaching Standards (NBPTS), as identified in *What teachers should know and be able to do* (NBPTS, 1997). In particular, one of the five core propositions of the NBPTS states that teacher-leaders are responsible for "managing and monitoring student learning" (p. 21). The definition of that proposition includes references to the fact that accomplished teachers, "regularly assess student progress" (p. 25). The definition includes a more specific prescription that:

> Assessment in teaching is not a simple task; teachers must monitor the successes and failures of individual students and evaluate their classes as collectives of learners. Additionally they make judgments about themselves as teachers in relation to those students and classes (p. 25).

Clearly, the work of these different groups concerned with the development in school leaders, whether school principals or teacher-leaders, suggests that more focus needs to be placed on assessment, data management, the use of data in decision-making at the local school level. One of the difficulties in using these standards, functional areas, or core propositions, in program development efforts, is the fact that they are necessarily broad and are not tailored to specific local or regional applications. Specific program modifications at East Tennessee State University required that best practices related to assessment, data management, the use of data in decision-making at the local school level, be generated through discussions with recognized school leaders from the service area for our own institution. The emerging role and recognition of teacher leaders in schools also suggested that "best practice" be addressed from the standpoint of both outstanding principals and teacher leaders.

With this in mind, the purpose of this study was to identify Tennessee principals' and teacher-leaders' beliefs about the knowledge and skills required of leaders when using data to improve educational decision-making. Although the importance of general data-related competencies has been described in

the literature, this research effort was designed to identify more specific and/or more regionalized knowledge and skills that professionals believe to be important.

Research Questions

Three primary research questions were addressed in this study: 1) What differences exist in the data-related knowledge and skill needed by principals and teacher leaders? 2) What knowledge and skills should school leaders have if they are to successfully work with data? 3) What type of learning experiences would enable participants in principal preparation programs to develop this knowledge and related skills?

Methods

In an effort to understand how principals and teacher leaders use data in their daily activities, personal interviews were conducted with 10 principals and 10 teacher-leaders certified by the National Board for Professional Teaching Standards (NBPTS). The principals and teacher-leaders were selected purposefully (Patton, 2002) from a list of all principals and NBPTS–certified teachers from the Northeast Tennessee Region. Participants were selected serially (Lincoln and Guba, 1985), and an attempt was made to select principals and teachers from elementary, middle, and high schools and also from city and county school systems. This purposeful sampling process was not intended to provide a representative sample, in statistical sense. The purposeful sample was designed to elicit opinions from representative from the different subgroups.

Among the principals, five were from city schools and five were from county schools. Three were from the elementary level, four were from middle schools, and three were from high schools. Four of the principals were men and six were women. Among the teacher-leaders, eight were from city schools and two were from county schools. Five of the teacher-leaders were from the elementary level, five were from the middle school level, and one was from the high school level. There was on one man selected in the teacher-leader group, while nine were women. These characteristics are consistent with the demographic distribution of board-certified teachers in the region.

During the first two interviews, structured interview schedules were used to structure the

questioning process (Appendix A). After it became apparent that the schedule was becoming too restrictive, a more informal interview approach was used with more broadly stated, unstandardized questions. This informal interviewing format allowed for a more diverse set of responses. The interviews were all tape recorded and subsequently transcribed. The data were recorded on disk and entered into the QSR NUDIST 4.0 (Qualitative Solutions and Research Pty Ltd, 2000) for processing. Using constant comparative data analysis procedures (Lincoln and Guba, 1985), a series of general categories emerged from the data under each of the three research questions. Under questions one and three, these general categories were then combined and arranged under a set of more general themes. These themes and categories are presented below. Collectively these descriptions should enhance understanding of the data-related knowledge and skills needed by school leaders in Tennessee. The results should also be helpful to those with a more general interest in reforming school leadership preparation programs.

Results

The results are organized around the three major research questions. Each of the questions will be examined sequentially.

Research Question #1

The first research question posed was: *"What differences exist in the data-related knowledge and skill needed by principals and teacher-leaders ?"*. There was a great deal of similarity in participant responses that seemed to be related to this question. These responses resulted on the development of two major themes that are presented below.

Theme 1: In general, principals and teacher-leaders should have the same knowledge and skill related to data and its use in educational decision-making, although the specific focus and depth of understanding varies.

A consistent message that was heard from both the principals and teacher-leaders was that the desired data-related knowledge and skills mentioned during the interviews should be applicable to both principals and teacher-leaders; i.e., both principals and teacher leaders should have the same knowledge and skill set. While this message usually emerged toward the end of the interviews, after interviewees had identified the required knowledge and skills, it is mentioned here because in the discussion that

follows, the knowledge and skills are combined, rather than presented separately for principals and teachers. Although there is a tremendous amount to know about data in schools, it appears that school leaders, whether they are principals or teacher-leaders, need to have the same basic understanding. For example, one teacher provided a representative response when she said:

> There are no differences in the knowledge that should be expected. They [principals] need to know what we [teachers] need to know and we need to know what they know, because we are all growing and working in the same environment for the good of the kids. I don't see a difference. They need to know how the students are performing. They need to know that kids have different strengths and different learning styles, so that when they walk into the classroom they may see different things. So we're dealing with the same things.

Another teacher suggested that school principals should understand classroom data because it would help them assist individual teachers in their work with specific children in the classroom. She stated, "they [principals] need to know as much as we do because they must understand what great options we have to use. If you had a principal who was only interested in numbers, that would be a very scary thing." Respondents felt that principals need to be familiar with much more than school-wide data and standardized tests. As instructional leaders working with board-certified teachers, principals must be aware of classroom data collection and analysis strategies, even if they do not use them directly. They must also have a respect for the knowledge of the teacher-leaders and allow teachers to use them independently, providing assistance when necessary. In describing her principal, one teacher noted that, "'there is no way she can come down here and do portfolio assessment on every child or even have a specific notion of what should be done--she has to trust us--and we have to trust that she understands portfolio assessment and how we can use it as a tool in our teaching and know what to put in their and pass along". Teachers also recognized that while they needed to have the knowledge and skills to use more broad-based data, such as the data obtained from the yearly standardized tests, the principal had to place more emphasis on these type of data, since he or she was charged with looking at the performance of the entire school. As one teacher noted about her principal, "she has to take the data to the board with all of those numbers, whereas the numbers are not as important to me as a first grade teacher". Another teacher noted that while the knowledge and skills were the same for principals and teachers,

"they [principals] need to always be looking at the larger picture--to everyone---and that is what is different about them". Teachers and principals seemed to suggest that it was not that the two groups of leaders differed in knowledge or skill, but a difference in perspective. One teacher's quote perhaps best sums up this explanation:

> I mean, my perspective on data and evaluation is that it has to be for the childrens' benefit. For me it is not scoring something or giving a kid a grade or whatever, but how I can help him or her in the class. For principals, I think they are more accountable for those data and are more accountable for what goes on in the school. So they look at it from a different perspective.

Teachers need have a strong understanding of overall school assessment, even if the standardized testing information is not used on a daily basis in the classroom. As one teacher put it, "we all need to understand the numbers—what the numbers represent. We look at numbers, we look at value-added [scores], we look at year-to-year. I mean, there is so much to know that I can't imagine that piece would be any different for a principal or a teacher". Several teacher respondents did not, however, see it as part of their job to delve into the scores of other instructional groups in the building. As one teacher put it, "Now—does a teacher need to know how this team compares to that team, as compared to another team? Probably not, unless looking for patterns or something. But the principal needs to know that".

Generally, principals shared this same view, that school leaders should have the same knowledge and skill, even if it was applied differently. As one principal put it:

> We need pretty much the same knowledge but just use it in different amounts. I realize that as principal, I am a generalist and I don't want teachers thinking I am coming into their classroom and that I know all the answers. They are the professionals. Now I need to have some knowledge to bring to the table, but I am not the expert in that.

There did seem to be agreement among interviewees, that teacher-leaders needed to have the same broadened view of data that the principals are required to have and that they cannot focus only on the data used in their own classrooms. Several principals pointed out that teacher-leaders also needed to be more aware of the "broader picture", including state and federal policy that might affect the use of data in the school. According to one principal, teacher-leaders need to have a general knowledge of such policy

and how it affects learning in their school and classroom, "although they need to know it to the same level of depth that I do as principal".

It appears that the data-related knowledge and skill required of principals and teacher-leaders in our schools are very similar. Principals and teacher-leaders need to have a base level of knowledge and skill in each of the areas discussed below, although the development of more specialized expertise and attention does vary. As one teacher put it, "there is not just one way to collect data but there are lots of different ways.....and [school leaders] need to know about the different ways to collect data or different kinds of data."

Theme 2: Principals and teacher-leaders act as "translators" or "interpreters" of data and thus are essential in the diffusion of data-based information to school stakeholders.

A second theme related to the first research question involved the role that virtually all the interviewees played, the role of data translator and interpreter. Principals and teacher-leaders were frequently called on to translate or interpret data to others. These leaders found it necessary to use the broad-based knowledge and skill that they had to share the results of assessment with others. In doing so, they needed to know enough about the information to break it down into a less complex form to share with others. This interpretive skill is critical to the effective use of data in the school. While principals and teacher-leaders interpreted data to different audiences, the process still involved taking more complex information and making it practical and useable.

Teacher-leaders reported they often needed to interpret classroom data and individual test scores to parents, who find scores and checklists confusing. Parents have difficulty understanding the meaning of standardized test scores, benchmark testing levels, and what it meant to achieve mastery or non-mastery. According to one teacher, since she "understood it more fully", it was her responsibility to take the information and relay it to parents so they can understand". This interpretive skill includes the ability to eliminate jargon from the discussion and focus the discussion on what the performance data mean, rather than the numbers themselves. In sharing her craft knowledge, one teacher suggested that:

> In talking to parents , they need the 'bottomline'. They appreciate a lack of jargon in conversations with them. They are more interested in your concern with their child as a human being—rather than understanding of test scores. I think it is necessary to understand scores—yes. I think to have a background knowledge of

> what the score says is necessary to be a professional. I think we need the ability to decode that for the public.

While the view was not held by all the principals, several principals expressed the opinion that it was important for principals to serve as translators and interpreters of school wide data-based information, particularly test score information, to teaching staff. Their reasons, however, were related to a desire to "take the load off" teachers, rather than a belief that teachers could not understand the data. These principals felt that teachers had enough to do in their classrooms, without being asked to examine test score information. According to one principal. "We have to present it [data] to our teachers. We have to be able to put it in terms that they can get a hold of right away and get going in a hurray--without bombarding them with it---and we have to be able to decide, these are the most important things for the teachers to know". At least one of the veteran principals expressed a need to reverse the interpretive process, however, given a growing sense that he had been doing too much interpretation of data for his teachers. According to this principal:

> What I really want to achieve is what I would describe as more teacher-ownership of the data. I've been principal here for a long time and I have always tried to protect the teachers. I want teachers to use the test results but I have never wanted it to be so high stakes that they were afraid of it. And I have almost tried to buffer them from the pressures. I've probably gone a little to far in that. Now, instead of the data being mine to be dispensed, I am going to create an environment in which the data is ours.

Through the interviews it was apparent that both teacher-leaders and principals are called upon to help others translate and interpret data, although the audiences and purpose for the interpretation varies.

Research Question #2

The second research question was: *"What knowledge and skills should school leaders have if they are to successfully work with data?"*. Although not broken down into thematic statements, the following general categories of knowledge and skill were identified as being relevant to all school leaders, 1) The School Improvement Process, 2) Types of Assessment Data, 3) Managing Data, 4) Analyzing Data and Data Quality, 5) Using Data To Improve Teaching and Learning, 6) Making Data Public, and 7) Accountability Issues. Within each of these broad areas, participants described clusters of specific

knowledge and skills. Each of these will be described in this section and, where appropriate, examples are given.

The School Improvement Process. One of the areas of knowledge and skill most often identified by teacher-leaders and principals was the school improvement plan and the school improvement planning process. Both groups of school leaders felt that is was essential that principals and teachers had a clear understanding of this process. The school improvement plan is highly data driven and has become the vehicle through which schools conduct an examination of current performance and set goals and objectives for future activities. Nearly all of those interviewed noted that this was the first thing that a new principal or teacher should know about prior to joining a new school. One of the teacher-leaders even suggested that "one of the first things principals should do with new hires is to familiarize them with the school improvement plan and the school's long term goals", because this plan is what gives direction to those who work in the school. One of the principals stressed the importance of the school improvement plan by suggesting that, "the school improvement plan is like our bible now. I mean, [school leaders] need that desperately now. You set your action plan through that and go by that yearly".

The school improvement plan is based on a thorough review of data, that includes disaggregated test scores, classroom observations, grades, performance assessments, attendance data, disciplinary data, analysis of special populations, and survey results. All the different types of data that are mentioned later in this paper are used in the school improvement plan to set future direction for the school. School leaders need to understand the nature of those data. According to one of the principals:

> First of all, our school improvement plan is based on a review and analysis of TCAP, TVAS, the TCAP writing assessment, data that we get from out math lab, CCC math lab, teacher observation, grades, and all of those things that teachers do on a daily basis as well. We try to use that information to choose our goals and objectives, being sure that our goals are compatible with system goals, and then choose strategies that are based on the information we have.

The disaggregation of data are very important in this process. For example, one principal noted that, "you get a very good score if you can disaggregate the data and show whether by gender, ethnic background, or socioeconomic status, all groups are making the same types of academic gains". School leaders need

to be able to disaggregate data or work with others who can, in order to identify opportunities for school improvement.

While data collection and analysis skills are important, the interviewees noted that school leaders also need group facilitation skills, since the school improvement process is a "team effort". Leaders must be able to understand the staff, organize staff members into effective teams to work on different sections of the plan, and then facilitate the efforts of those teams. While nearly all recognized that the "principal is the major leader in school improvement", it must be a team effort. According to one principal, "most schools at this point have a planning team [or teams] and those people are used to looking at information, or should be". The principal's role should be to keep the planning groups focused by asking "has your group handled this type of information to plan instruction, because everything we do is supposed to be data driven". This same principal went on to describe the process as follows "it's compiling information, it's analyzing information, and then it is deciding what steps to take in using the information to drive decision-making". Nearly all the principals mentioned how important it was that, although the principal was not dictating the process, he or she was directly involved at every point in the process.

In summary, the interviewees described a school improvement planning process that requires cognitive understanding of the process and the group facilitation skills to make it happen. The process, as described by these school leaders, is more than an exercise that is completed for the state. Instead it is a process that leads to school renewal and sets the priorities for the school. Those going into new leadership positions in schools, therefore, need to become very familiar with current school improvement plans and well versed in the school improvement planning process. They also need to have a good understanding of the types of data called for in the plan. These leaders also need to understand the makeup of the staff, be skilled in forming and facilitating the work of others.

Types of Assessment Data. Interviewees identified a number of different types of data that are used in schools to enhance decision-making. While many of these approaches are more relevant to those working directly with children in classrooms, the interviewees seemed to be in agreement that school

leaders needed to at least understand how to collect information through these different methods and know how the specific data can be used to improve instruction. A brief summary of each of the recommended data types is presented below.

Surveys. Nearly every interviewee reported that surveys represented a major source of data, although the type of information collected and target audience varied. The importance of surveys as a tool for educational decision-makers cannot be overestimated. School leaders simply must have an understanding of how to construct more informal surveys, identify formal survey instruments that may be available from other sources, collect and analyze survey data, and report results. Several principals and teacher-leaders reported having a file of different types of survey instruments that could be used or modified to meet particular needs.

Surveys are often used in conjunction with the School Improvement Process; in fact, they are required. All of the principals reported using periodic (usually annual) surveys of parents, and in some cases, community members. Several principals reported surveying students, parents, and staff members, every year, as part of this process.

Surveys sometimes have more specific uses, as well. One principal recalled using surveys of parents prior to her arrival at the school, in order to get a better understanding of the community culture that she was becoming part of. All of the teacher-leaders reported conducting beginning of the year surveys of parents to learn of parental classroom expectations and gain a better understanding of the incoming students' characteristics. According to one veteran teacher:

> At the very beginning of the year I send out a survey to parents, that asks for some general information about the children. I also put on the parent's survey 'Is there any information that you'd like to share with me that could help your child be happy and well-adjusted during this school year?' It is amazing the amount of information I get from parents. They share a lot of things that you may not know until you meet them midway through the year .

Staff surveys are often used to gauge school climate and the principals used these quite often. One principal summed up their value when she stated that, "I survey my teachers every year for their level of satisfaction, my performance, and our school climate and culture, and changes they would like to see...and then I give them the results of that and their open-ended comments". This type of formative

evaluation is very helpful to the principals.

Student surveys are also widely used to gauge student opinion. For example, one high school principal reported sending out a survey to students twice each year to "understand their perspectives on certain issues". This principal disaggregated the responses by grade level to understand the unique perspectives held by each class of students. All of the teacher-leaders reported having students complete surveys prior to beginning a new school year and surveys were used as a means of continuously monitoring students' progress. For example, one middle school teacher reported that students were asked to share "personal notes" on 4 x 6 cards during the first week of class and share any information they deemed pertinent. Another veteran teacher noted that "another thing that I do a lot with my kids is an interest inventory and I do this because I need to know what's going on to motivate the kids". Clearly, it is important that school leaders are able to design, obtain, and analyze data from survey instruments, whether at the school or classroom level.

Standardized Tests. Standardized tests are clearly a major source of data that are used by school leaders in Tennessee to evaluate performance as part of the state's accountability model. Testing data are integral to the development of the school improvement plan and influence the way in which resources are allocated. The Terra Nova test is mandated in grades 3-8 across the state. Two primary types of data come from the Terra Nova Test; the performance data (Terra Nova) and Tennessee Value-added Assessment System(TVAS). School leaders at this level need to be able to interpret the different score reports that come from these accountability systems. As one teacher described it, "A teacher needs to be able to find strengths and weaknesses and make changes as strengths and weaknesses become evident from looking at student scores and tracking themselves as to where their gains are and where the gains are not over time". At the high school level, students are expected to pass a series of "Gateway" examinations to graduate from high school. One of the interviewees, the principal of a high-performing high school from the region, noted that:

> You need to be aware and know how teachers have done their grades in their classes and then know what an impact those data will have on the student, the classroom, and for your school. Because that's what is published in the school report card, it's made public information. I don't know that it's directly a part of your job situation but in some schools that are highly competitive, where you're looking at raising the standard, either showing growth or maintaining where you are,

> it is pretty critical when the superintendent looks at data driven evidence that's in the newspaper...are you showing growth to the community, are you showing improvement in these areas, are you reaching down to the bottom and cleaning up some of those scores and pulling those scores up? So it's a very public exposure and they're real careful about scrutinizing the data.

Clearly, all school leaders need to understand these standardized tests and the data that come from them. They also need to work with staff to help them understand these standardized assessments and how the information from these tests can be used to improve instruction.

Tests and Quizzes. Tests and quizzes are still an important source of information at the classroom level. Although there was much more discussion of standardized tests, several teacher-leaders noted the importance of teacher-made tests and quizzes for targeting specific skill development in the classroom. One middle school teacher noted that "I use data from pretests and posttests to adapt my teaching techniques with students". Another noted that "I do give tests and quizzes that may be as simple as multiple choice or true false. These can be used to check basic factual recall or comprehension". Other teacher leaders reported using "homemade" reading quizzes to assess specific reading skills. School leaders need to understand how to construct tests and quizzes and to use them as diagnostic tools in the instructional process.

Benchmarks and Checklists. Benchmarks and benchmark assessments were used by a number of the teacher-leaders from the elementary school level. Benchmarks consist of a series of "milestones" that are recorded as students progress from one task to the next. Teachers must periodically identify whether or not students have mastered the task or reached the benchmark. Benchmarks are often associated with spreadsheet type checklists that teachers complete after observing student performance or administering a benchmark test. Generally these benchmarks had been adopted by the employing school system and were used system-wide. According to one of the teacher-leaders, a benchmark system "makes sure that we're on task, it helps me prepare also. It helps me not to forget that at this point in time, I should make sure that I am hitting this skill religiously and am not forgetting to get over their". Another veteran first grade teacher endorsed the benchmark approach, when she stated "I am not a big assessment person at all, but I have found this to be very successful, and I was not thinking it

was going to be, but it has been very helpful for me. Benchmarks and benchmark exams are being used increasingly at the high school level as the Gateway Testing Process is implemented. For example, one high school principal reported that benchmarks were currently being implemented in her school. She stated that:

> We're using last years biology and algebra exams to establish some benchmarks throughout the year that the student should need, in terms of skills in those areas. That is all new this year so I don't know how effective it is, but we are testing them every six weeks to see if they've mastered the skills. They continue to do that throughout the year to identify pieces of the Gateway Skill section they are not achieving or learning, and to remediate that before they take the exam, hopefully to help them pass it.

It appears that the use of benchmarking and benchmark assessment systems will continue to grow at both the elementary, middle, and high school levels. School leaders must have an understanding of those benchmarks and strategies for developing related assessment procedures.

Developmental Checklists. Although related to benchmarking assessments, developmental checklists were mentioned as a separate category by teacher-leaders at the early elementary level. These checklists are used to document the developmental progression of young students and serve as a vehicle to link the home and school, as students take them home regularly to solicit parent feedback.

Performance Assessments. In different ways, many of the interviewees suggested that teacher leaders needed to have a good understanding of how to create and use performance assessments or "authentic assessments". This was stressed repeatedly in the interviews. One elementary principal addressed it directly when she stated:

> I think that teacher-leaders need to know about authentic assessments. And I think they need to understand the different ways of knowing and the different ways of communicating what you know as being valid...that every assessment shouldn't be paper and pencil....and that we need to take a look at the "snapshot view" of what a child does.

Portfolios. A number of the interviewees discussed the importance of portfolios and portfolio assessment as a means of representing student growth and development. Teacher-leaders at the elementary, middle, and high school levels reported using portfolios, at least to some extent. While none of the teachers relied solely on the use of portfolios, many used them to supplement other evaluation strategies. For example, one of the high school teacher-leaders stated that her biology students did not

create year-long portfolios, but that they created portfolio units to go along with field study projects. School leaders need to know how to help teachers work with portfolio to document student growth. One of the middle school principals identified promise and peril of portfolio assessment, by describing portfolio use in her own school:

> Our teachers are doing some portfolio types of assessments, which to me has a lot of promise, but the nation and the state are so focused on numbers and that kind of specific test data, that it is hard for us to get that excited about portfolios. To me, however, it is a really good tool to determine progress, increased skill development, and those types of things...you know those things that we value.

Rubrics. The use of rubrics has accelerated in recent years and in most schools, teachers are using rubrics as part of the overall assessment process. While some of the interviewees developed their own, others "borrowed" from other sources. One middle school teacher described her experience as follows: "I have developed some and some I have modified from others that I have found in books or ones I have picked up in workshops or something like that, but almost always you have to customize them". School leaders need to have an understanding of rubrics and how they can best be developed and used in the classroom. While the principal may not be and expert on the use of rubrics, he or she should be familiar with their use and be able to assist faculty who might want to begin to use them. One teacher-leader described it this way:

> I wouldn't say that the principal should be able to sit down and develop rubrics, but if he feels that there is a deficit in that area within the school....he'll certainly have to set the tone for the school. Principals are generally too busy to do the needed training themselves but they certainly should know when to bring in needed assistance.

Writing Assessment. Many of the best authentic assessment practices described by the teacher-leaders occurred in the area of writing assessment. The teacher-leaders in this study reported using a combination of journal writing, benchmarking, portfolio assessments, and rubrics in assessing writing skills. School leaders in elementary and middle schools need to have a good understanding of strategies used in assessing writing.

Special Education Assessment. Several of the principals indicated that it was important for school leaders to be familiar with current assessment practices in special education and to have a working

knowledge of the most commonly used assessment tools in special education. One principal summed it up this way:

> Almost on a daily basis we have a meeting where we have to refer to some special education testing and probably that sticks out in my mind as one area that you really have to be able to look at what test we're doing and be able to analyze the results and at least have a pretty good idea of where that student falls in relation to other kids. So looking at the Woodcock-Johnson and some of these tests that are common special education tests, you need to be able to know what those tests are measuring and how to compare them.

Another principal indicated that she "could not think of anything worse than going to an IEP meeting and not knowing what they are talking about". This sentiment was echoed by several teacher-leaders as well. Several teacher-leaders also reported that they should have a working knowledge of the tests used in special education so that they might be better able to understand a child's strengths and weaknesses and differentiate instruction accordingly.

Behavioral Charting. Several of the principals suggested that the future school leaders were going to have to rely much more heavily on an assessment technique known as behavioral charting, as schools are faced with an increasing number of children with behavioral disorders. These leaders noted that the behavioral problems were "becoming more severe and serious in elementary school". School leaders will need to know how to bring a behavioral team together to address the needs of behaviorally challenged children, record behavioral data through the use of observation and behavioral charts, plan intervention team meetings to analyze the data, and facilitate teams in development of behavioral intervention plans.

Computerized Assessments. Both principals and teacher-leaders described the use of computerized assessment programs in schools, such as the star reading program, CCC Math Program, and the Accelerated Reader Program, to name a few. School leaders need to have a working familiarity with programs such as these and must also be constantly on the lookout for new programs.

Reflective Writing. Nearly all of the teacher-leaders who were interviewed discussed reflective writing as a valuable process for generating data upon which to base educational decisions. Two teachers described the way in which they called on students to reflect on lessons or activities and offer suggestions for improvement. One of the teachers described the process like this:

> I do a lot with student-generated data as well. I have my students reflect a great deal. In the last two weeks they have written reflections on "my first six weeks" in this language arts class. Reflections on the homework as it was the first six weeks; what was working for them and what was helping them grow as a reader and writer. I always go back to them [student reflections] when I don't know what to do and I read their comments...and they are invaluable to me.

Other teachers reported using their own reflections as a source of data. Whether completed at the end of a workday or at the end of the school year, reflective comments can be the stimulus for real professional growth and development. One of the middle school teachers described this process as follows: "I wait until the end of the day to write about how I dealt with a certain situation or concerns that I have....or about the way a lesson went.....and it is kind of neat to go back and look at that and read it and get some ideas about your teaching from that". School leaders need to have an appreciation for the value of reflection and need to be able to assist colleagues who are trying to engage in reflective activities.

Learning Styles Assessment. With a new interest in the multiple intelligences and learning styles of children, it is important that school leaders be familiar with the theories and assessment tools available for these different intelligences or styles . One of the teacher leaders in this study reported that she administered a learning styles assessment at the beginning of each year in an effort to understand the preferred learning modality of individual children. Teachers reported that with an understanding of learning style, they were better able to differentiate their instruction.

Observation. Most of the teacher leaders in this study pointed to the importance of teacher observation as a data-gathering tool. At the elementary school level this was one of the primary means of collecting data. As one teacher described it, "it's constant observation". She went on to say that "you can never take your eyes off of them for two minutes. You know I am watching them all the time so I know who is going to be unsatisfactory or who will need improvement, even before I open the grade book." While some teachers reported using structured forms to record their observations on, others reported that the data was kept "inside their heads". Observations did not just happen at school either. One teacher described her home visits and the data she was able to glean from those visits, as data were recorded on home visitation logs. School leaders need to have an understanding of observational strategies and the various data collection logs and/or forms that could be used.

Conversational Data. Conversations with parents are important sources of information for teachers and should not be overlooked. Respondents reported using a variety of logs, forms, cards, and checklists to record the results of conversations with parents. One veteran middle school teacher described her experience and strategy this way: "I use a 4 x 6 card to keep my notes on for every telephone call I make . So that I have a running record of the year, who I talked to....when I talked to them...and what was said. Again, I don't trust my memory and I need a paper trail". School leaders need to be able to work with teachers to develop tools that will aid in the collection of informal conversational data.

Records and Archival Data. While not used as frequently, student records and archival records were used by some of the teacher-leaders to gather data on their students. This may consist of looking in a student's cumulative folder in the office. It should be mentioned, however, that two teachers mentioned that they "stayed away from the records" for fear of forming opinions that might inappropriately affect their work with a child. One of these teachers described her dilemma this way: "A lot of teachers when they get new students, they go through the student record. I rarely do that because I have a fear of self-fulfilling prophesy". School leaders need to have a good understanding of the record system being used at the school and be in a position to assist teachers who may want access to those data.

Specialized Standardized Tests. Standardized tests that are used for "other" purposes were also part of the data that school leaders used in evaluating their instructional programs. For example, two teacher-leaders from the high school level discussed the importance of examining information from AP examination results to gauge areas of curricular strength and weakness. Two high school principals reported looking at the ACT results in examining curriculum. One of the principals described it this way, "What we did last year with school improvement was to look at the ACT scores, because most of our students don't take the SAT. From those test scores we compared ourselves to the national average, which is about all you've got, understanding that all of our students don't take that test". While these sources of data were not used nearly as frequently as the Terra Nova or Gateway examination data, they were important.

College Performance. Two of the principals at the high school level reported subsequent success of former students as an important source of data on the curriculum. One principal from a rural high school described her use of college performance data this way:

> We have been trying to improve the percentage of our students who go on to postsecondary and have been getting reports back about the performance of those students. UT and ETSU send us reports on how our students do once they get to college. We've been working with some of the private schools also here in the area to get information back on how our former students are doing in Math, how they are doing in English, etc., and I'm sitting down with the departments and saying, 'OK...the kids aren't doing well', what are we going to do about it?

College performance data can also serve as a very important source of information, particularly for those school leaders at the high school level.

Attendance and Discipline Records. Two principals mentioned the importance of keeping a detailed record of discipline referrals, beyond the standard reporting requirements. Both of these principals mentioned the importance of examining the trends in these discipline issues, just as trends in testing data are examined. An elementary principal from a very rural school system described his process for monitoring discipline as follows:

> I have teachers fill out a daily data form that I then look at. It covers today's injuries, today's absentees, today's tardies, today's students who leave early, special things that happened today in the classroom. I take those data and compare this six weeks with the previous six weeks, or last year's data. And it shows me, the injury reports specifically show me how certain teachers are and are not able to control students; for example, you might have one teacher with a much large number of injuries. I also do discipline tallies from these forms, called parent conferences, etc.

Attendance data are required as part of the state accountability model. All of the principals mentioned the importance of collecting accurate attendance data. At the high school level, this attendance reporting process was computerized and reports were send directly from the teachers classrooms into the particular student information system that was being used, with an "attendance secretary" running the system. All the principals, however, noted that they should be familiar with this student information system, even if they did not directly enter the data. At the elementary system a similar recording process was followed, although the data entry most often occurred in the central office.

One high school teacher expressed an opinion that much more could be done with attendance data than is currently being done. This principal suggested that, "it would be interesting to look at the

attendance data more closely and perhaps compare it to their grades and what paths they are on...I mean there are all kinds of ways of looking at that if you had the time or a person to do it". Another elementary school principal suggested something similar when she describe an experience she had had:

> I was trying to get a local grant for upgrading our after-school program which has basically been, in and out with the kickball. We wanted to develop some clubs and activities. So I was able to demonstrate that on those days where children had an activity after school, they were present almost 100% of the time.

Clearly, attendance and discipline data are important sources of information and are perhaps some of the most "underutilized" data available in the schools. School leaders need to have an understanding of the student information system that is being used and the kind of data that come from that system. They also need to be able to disaggregate and analyze those data in order to make better decisions about subgroups of students and the curriculum.

Scheduling Data. Two of the high school principals described the importance of obtaining data from students and parents on the kinds of courses that they would like to take. These data are often collected through polls or surveys. Preference data are then used in conjunction with information on the teaching staff and their teaching area. The student information and/or scheduling program is then used to develop a schedule that is built on these data. For principals at the high school level, they must know how to collect these data that will enable them to develop schedules.

Other "Unique" Data. A number of more specific and unique sources of data were cited as being used by those interviewed. These included such things as optional standardized tests at the elementary level, data on pattern of milk usage in the cafeteria, or optional assessments for students in an enrichment program. There did seem to be agreement that school leaders needed to be aware of, although not an expert in, the use of a number of assessment tools, whether these were needed to document milk usage or diagnose a problem with a particular child. As an example, one elementary school principal put it this way:

> I think it is very important for principals to be able to know what process to use for placing a child. A new child comes in the building and mom says that the last school wanted to retain the child but she does not want them retained. So what would you say ? How do you evaluate where that child needs to go? You've got to know what type of standardized test or what type of assessment you are going to use to make that placement, whether it be a Stanford test, a reading level test, or Light's Retention Scale.

School leaders need to have an awareness of a variety of data collection tools or opportunities that are relevant to their own unique situation.

Standards and Data. Several of the teachers and principals noted that when talking about the collection of data, it was important to stress that school leaders (both teachers-leaders and principals) needed to have a firm grasp of the particular standards that should be guiding the instruction in their schools. One of the middle school teachers suggested that, "individual classroom teachers need to have a good foundation in the use of standards that goes well beyond just dealing with state standards. They need to understand their content area standards that come from their professional associations". Several teachers and principals also felt that it was important for school principals to also have a firm understanding of standards, because, as one principal put it, "they're moving from an individual curriculum now to the whole school leadership and that implies that they'll be well-rounded and knowledgeable on a variety of things". One teacher noted that principals should encourage teachers to be involved in their professional associations and use the standards in their instruction, stating that the state standards "represent minimal expectations". She went on to mention specifically the national standards established by the professional associations in Math, English, Social Studies, and Science. Another teacher summed up the importance of standards as follows:

> I think that principals need to understand the teachers' national organizations in each subject area and be somewhat familiar with the content standards of the professional community. [They need to] help teachers understand the standards and have the time to direct them towards standards when they're having difficulty in teaching.

Knowledge of content standards is, clearly, critical to the entire assessment process. Those interviewed reported that all school leaders should be well-versed in the different content standards.

In summary, there are a number of different types of data that school leaders should be familiar with and know how to use. While some are more specific to elementary/middle schools and others are more relevant to high schools, school leaders (principals and teacher-leaders) need to have an understanding of them.

Data Management. Interviewees identified a number of different ways in which they organized and managed the data that are generated at the school level. These data management approaches encompassed both data collected by individual teachers on specific children and school-wide data. These "management" approaches are summarized below.

Student Filing Systems. The teachers who were interviewed all discussed, to some degree, the importance of having a filing system that is easy to use, simple to understand, and easy to explain to parents. One of the teachers explained her simple filing system as follows: "If I write something down that is really important to me I just put it on a Post It note with their name and the data of the message. I usually stick it on my desk and then everybody has a file and I can just put that inside of their little folder at the end of the day or whatever." Another teacher used a notebook rather than a file system, and she described her system as follows:

> I used to think, and was the one who said, 'Oh, I have that in my head'. But you can't..... you absolutely can not be effective without having something written down and that comes right down to management. I don't think there is one right way. What it is...it must be a quick and easy way to make some notes...so that learning is not interrupted...so that teaching is not interrupted. For me it is a notebook. And that is where I record the incidental things that happen in a day that I need to make note of. It was the sticky notes. That is another part of the management system...you have to just come out with what works for you.

Files and notebooks are used by teachers to record incidental comments, attendance information, parent contact information, benchmark checklists, standardized testing information, etc. One of the teachers also reported using a separate school-wide writing assessment portfolio that was passed along from grade to grade as the student moved through school. In addition to these in classroom assessment files, teachers also had access to the school record files. While two teachers noted that it was sometimes helpful to consult the formal student files, other teachers suggested that they relied more on their own, less formal assessment files.

Student Information Systems. The majority of interviewees at least mentioned their school student information system as a major way to manage data. Several principals discussed the fact that these management information systems were now such that teachers would enter data right on computers from their classrooms and these data would eventually be sent electronically to the State Department of

Education. Attendance data and grades are all entered in this way. This was particularly true at the high school level. One principal described his management information system and the entering of test grades as follows, " that is all done in the classroom and the teacher actually learns how to tailor the program to accommodate what they want to do". Interestingly, two of the principals that were interviewed did not believe that the skills required to run these programs were terribly extensive. In fact, most of the time, principals did not actually enter data into the computer or generate reports. Rather administrative staff members or teachers were given that responsibility. Particularly at the high school level, the principals considered it important that they knew how these programs worked, but they did not actually spend a great deal of time running the software and working with data.

Central Office As A Resource For Managing Data. The central office was essential in providing data to most of the principals interviewed in this study. This was particularly true in working with standardized testing information. In the majority of the school systems represented in this study, the central office was responsible for analyzing standardized test scores and making the various reports available to the school principals. While in some cases these reports came directly from the state department of education, others were generated at the central office, often in response to requests from the schools. The Testmate Clarity software that is used to generate reports from the Terra Nova Testing program was generally available only at the central office, so in most cases, principals were not able to generate their own reports, even if they had wanted to. One of the schools represented in the interviews was an exception to this and each principal had a school copy of the software and generated his or her own reports. One middle school principal summed up her willingness and enthusiasm to rely on the Central Office for this data management support:

> [Individual name] is our Assistant Superintendent for Curriculum and she does this for us. That's the point I'd like to make. This kind of stuff [data analysis] is not my work.... I don't want this, it's tedious to me I do understand it but I do not like working in it and I don't want spending hours digging it out. But if you know that about yourself then you need to find someone or couple of someone's that you can rely on. You've got to identify your strengths and weaknesses and I'd rather much work with my teachers on how they're feeling about this, keeping in focus on the right direction and talk to them about curriculum and those kinds of things after we give them the data rather than digging the data out...like Testmate Clarity.

The central office staff members were critical in managing the massive amount of data that are needed by the school for school improvement planning purposes and in general this was work that most principals did not want to be doing anyway.

Technology To Manage Data. In addition to the student information software that was presented above and the Testmate Clarity software for analyzing the Terra Nova Data, principals reported that much of their day-to-data management of data was accomplished through multipurpose software packages such as Microsoft Office, and specifically the Excel Spreadsheet program. Microsoft Office was mentioned far more than any other software, although interestingly, Microsoft Access was not mentioned once. When asked about the potential utility of using a statistical analysis program instead of the Microsoft Office software, one principal offered what was a typical response:

> I would [use Microsoft Office] because it is the standard. Everybody has it and using it effectively is the real key. It integrates well with most other things, so it is definitely the standard. Very few principals would use a statistical package, other than what is offered through Microsoft.

Teachers, particularly those at the middle and high school levels, reported using specific electronic grade book programs to manage their data at the classroom level, as well as Microsoft Excel.

Analyzing Data and Data Quality. The school leaders identified a number of different ways that data are analyzed at the school and classroom level. In doing so, the described clusters of knowledge and skills that school leaders should possess if they are to successfully analyze data. These are presented below:

Disaggregating of Data. Perhaps the single most common comment that emerged from the entire interview process was that school leaders needed to work with disaggregated data; i.e., take data and focus on subgroups of children on more specific skills. For example, this might mean looking at the highest performing students and the lowest performing students and comparing their performance in specific subtests of the Terra Nova Test or comparing the performance of boys and girls in specific subtests. For the most part, however, those who were interviewed did not actually conduct the analysis themselves, but relied on "disaggregated" data that they obtained from the State Department of Education of the central office for the school system. One of the principals described it this way:

> Most of the data that we get just comes in through the central office, what we do with it at that point I guess in a lot of respects is left up to individual principals, how you share it with

> your staff, how you use that to improve your students or improve your program or your curriculum. Basically you don't manipulate the data that much, you simply use it to put it in the form you need to look at it. To some degree it comes desegregated, we do need to disaggregate it more.

Four of the principals noted that since they began to get disaggregated information, they had been able to target interventions for specific groups of children. One principal from a small rural elementary discussed the changes that were made at her school by looking at very specific subgroups of students. She described the process as follows:

> Up until this point what we did was identify an area of need like whatever our school was low in.....whether it was language math or whatever and.....that's kind of how we used it to get to develop our school plan and stuff and decide what our areas of need were, but now we're taking it down to an individual level. We see big results from that and then this year the way the state department has divided up [the data] on the web site, we can actually take the special ed data and our boy to girl ratios and see how all that fits into it too.

One of the teachers also noted the value in looking at disaggregated data when she said:

> I think it is interesting to see these scores like Terra Nova scores. When we see these scores disaggregated down into different categories....it is interesting to see that data. I look at what you call a higher or good student and I look at my lower students and I look to see whether I am teaching towards the lower students, am I teaching the middle or do I have any applications of how it is that I am reaching 4 or 5 students and leaving the rest of them out. I think [we] need be able to take information and cut it up into little pieces and to look at it in different ways....like in groups according to economics or gender or race even getting a little bit more specific about maybe the grade equivalency of those students like for example special ed child that gets pulled out for resource.

Clearly, school leaders need to know how to understand data that is broken down in finer and finer subgroups through the process of disaggregation. While these data are more helpful to schools in planning change strategies, it does appear that at the current time they are dependent upon the State Department of Education or central office to do the disaggregating. One might ask if these leaders might obtain data that are more responsive to the information needs at the school if they were able to generate the disaggregated data at the school level.

Measurement Concepts and Test Score Analysis. Since so much of the data that are generated for schools and incorporated into school improvement plans are measures of standardized test scores, it appears that the biggest need facing school leaders is the need to be able to accurately interpret the various measurement concepts that are associated with the specific tests. For example, leaders need to know how to interpret the various printouts for the Terra Nova Test and understand the different type of

scales that are printed out. For example, leaders need to understand differences between scale scores, NCE scores, stoniness, percentiles, and grade equivalent scores and understand the meaning of the standard error of measurement to understand the confidence bands that are placed around scores. They also need to know the various descriptive measures used to describe the test scores, in particular the mean, standard deviation, and the concept of norm-referencing.

According to the interviewees, school leaders in Tennessee also need to understand the value-added scores that are part of the TVAS system and to understand where those gain scores came from and how they are calculated. This includes and understanding of the "expected gains" that are sent as benchmarks by the state. According to one of the principals, the best learning experience he and a team of his teachers had occurred while at a workshop that focused on measurement issues. According to that principal:

> At the academy we received information on how to read the [Terra Nova] forms. They gave us a good review on what their grade scales are that wind up on report cards – they gave us a good review on just what percentiles, NCE, and stoniness are – you know, the different measuring sticks. And then they walked us through some of the forms in here where you can take the information and plug it into the boxes that they have and then very easily analyze and it shows you maybe by content area where your strengths and weaknesses are, by grade level, where they are – it's just a real worthwhile. In this particular training session we would be shown an example on the overhead and then after a thorough discussion of it - the questions and answers and we as a group took our own data and we did our own forms and the fact that we could do that and ask questions in case we got stuck on something. But having your own data there and being able work through it right there, that really made it meaningful.

Several of the teachers were, however, concerned that you can "overdo" it with testing data, particularly when dealing with parents. One of the veteran teachers put it this way:

> Yes, I think teacher leaders need to be conversant with testing terms. I don't think it's some information that stays with you necessarily – I mean I've memorized it all 2-3 times in terms of terminology. In terms of being conversant with it on a daily basis, probably not, because I don't have the need....but I could be – it's not out of my range. I find in talking to parents that they need the bottom lines.....they appreciate a lack of jargon in conversations with them.

Principals and leaders need to be able to read standardized testing printouts that are being sent to the schools and they need know standard measurement and test analysis concepts associated with those tests. They do not, however, need to be measurement experts.

Statistical Skills. In general, neither principals nor teachers indicated that school leaders should be experts in statistical analysis. Generally, all respondents agreed that school leaders needed to have a strong understanding of descriptive statistics, including an understanding of central tendency and variability. They also suggested that it would be important to know how to look at those data over time and present the data using visual displays such as with graphs and charts. One of the principals suggested that school leaders need to know basic statistics. He stated that:

> I think they need to have a basic knowledge of how statistics can be used in the school. Most of the data that we use is not deep, deep statistics, but they are statistics where you need to know what the standard error, what a standard error of measurement is, you need to know what variance is, and what z scores are. As far as actually taking data and putting it into a computer and then doing it – we do it very little. [However] if you don't know what a z score is you can't interpret a test..it's always amazed me that there are people that think you add percentile scores – you know just being able to know the difference between those scores that you can add, subtract and those that you can sometimes.

According to one teacher, school leaders also need to know enough about statistics to know when they are "statistically abusing the data".

Reflective Practice. All teachers interviewed in this study were consistent in their belief that reflective practice was a major element in the data analysis process and a critical attribute of school leaders. According to a teacher from the early elementary grades, "

> I don't see how people can be a quality teacher and not reflect. I mean if you think you've got it right the first time, every time, all the time, and never dwell on it, you're wrong. You have to dwell on that and say...now... what made that successful? How did I get to that point? It is my philosophy that a really good teacher is never totally satisfied. They're always looking at it again. Trying to do better trying to do it one more way. And every year I write goals down to myself – somewhere and I stick them somewhere and then when I get them out at the end of the year I think....well...I got two of them....you know....that one is going back in there for next year. But you have to do that. I think you have to do that.

All the teachers noted that part of their expertise was tied into their ability to make notes on what has been working and not working in the classroom, spend time thinking about the reasons for the successes and failures, discussing those reasons with others, and developing a plan to try something difference the next time. Sometimes this reflective process occurred from one day to the next (e.g., during a car ride home) or from one year to the next. The important element was that the teachers took the time to reflect on what they were doing and make changes. This same reflective process seems to be evident in the many

school improvement team meetings, where teachers are looking at data from the standardized tests and collectively making changes to the curriculum.

Using Data to Improve Teaching and Learning. Interviewees identified a number of different types of data that are used in schools to enhance decision-making. While many of these approaches are more relevant to those working directly with children in classrooms, the interviewees seemed to be in agreement that school leaders needed to at least understand how to collect information through these different methods and know how the specific data can be used to improve instruction. A brief summary of each of the recommended data types is presented below.

Curriculum Development Through Teams. Throughout the interview process, the interviewees were asked to describe ways in which data were being used in the schools to improve learning. The most consistent theme heard among the respondents was the importance of teamwork in making sense of the testing data. In nearly every school represented in this study, a process of team building was developing to get teachers involved in the curriculum development process. In all the schools, groups of teachers were working together to analyze the disaggregated data. Sometimes these teams were vertical teams, including teachers, administrators, and other staff members. In other cases they the teams were formed within grade levels or in disciplinary areas. There was a remarkable consistency to the nature of these teams and their work, which most often centered on the completion of the school improvement plan. Principals were key in the formation of these teams. Nearly all of the principals noted that one of the important goals of this decentralized approach to data analysis was "teacher ownership of data". While a number of "curriculum team" models were shared during the course of the interviews, two will be highlighted here to show some ways in which the data are used by school teams. One of the teachers from a middle school described the process used at her school and a little of the theory behind the process:

> I have a theory and my theory is that the way you get things happen is not through your traditional ways, it's through relationships. You have to build relationships with teachers before you can get what you want to happen to happen and I think this comes with teaching teams - we have an ability to get things done on those that have good relationships because they can work together and they all work towards the kids. But if you have those that do not have time to build on those relationships then people aren't going on the same direction many times. And also if you're having a conflict it's easier to talk with someone you've built a rapport

with. As a team we look at Terra Nova scores, this is the data building part... each teaching team looks at Terra Novas in two ways; the kids you have just taught and the ones coming in. We do that at the very beginning of the school year. We sit down as a teaching team and look at that. We look at it both from the grade level standpoint and the content standpoint. It can be both. We have 4 sixth grade teaching teams. The teaching teams look at it as a team but then you may have a department like a science department or an art department and you want to look at it both ways because you want to look to see if there are some curriculum things that you may not be hitting. For example two years ago graphs and charts kept appearing as low points on the test and we knew that as a school we needed to look at graphs and charts. So that's Terra Nova – we all have access to it.

Another teacher described the sharing that resulted from her team meetings surrounding the testing data. In doing so, she highlighted the importance of making the data "nonthreatening" to teachers. She described her experience this way:

> One of the most effective times that I spent, I can remember where the principal brought to the room all of our scores for 5 years in every subject area that we were responsible for. All teachers were there – this was a required meeting day. We were given in service credit because we were going to be learning about our teaching methods and how effective they were as predicted by this set of scores. So everything was confidential, you had your set and beside your set of scores you had the grade level set of scores at your school. You knew the average then knew how you compared to the average of the school system. Then you had the state average, then you had a national norm and you could sit right there and see where you sat.
>
> No one else had your data but the presentation was going on up front on what to look for with the generic set of scores up there. With the 30 teachers, it did generate a lot of discussion and I remember back to only one person not sharing. Teachers began to open up and say "oh my goodness – this is terrible – I had no idea – no one in this room is worse than this ...and it was spelling. This was the first subject and I remember the spelling conversation. It seems to me there were approximately 30 people and finally one person said "I'll bet I had the worst!". So this teacher said "well what in the world are you doing in your rooms?". So it opened the dialogue of "I need help", which has not been typically what we do in our profession. We do what we do and we're private about it. We share a piece of paper, we share a good idea but then we don't often take the time to write it down. The important thing was that we were free to say "I need help". It was wonderful coming at it that way rather than someone saying "you've got to change".

The teacher also provided some excellent comments on the motives of the principal as group facilitator :

> To take that data...she obviously looked at it and knew where we all were... but that was not what she did with it. It was private, it was delivered to me in a plain brown envelope – I had mine in front of me but she directed me through PowerPoint and an overhead transparency. It had the data that showed me where to look but it was school wide – we were taking notes on it. We had highlighters. It was just like a math class. It focused me – rather than handing me my scores and saying "here they are". It was an activity. It was a process and she directed us through it. And she provided us with the opportunity for reflection. There was time to reflect on what you will do – what you have learned today. And it was none threatening and it was something about that atmosphere that made you want to say "Oh gee – do I need help". And maybe it was the teacher-leader that started that going. Maybe it was that special person in the room that's not afraid to say "I need help". That opened the door for everyone to say 'Oh boy do I need help in this area'. It was realization, it was reflection, it was sharing, it was seeking help.

While the process varied from school to school, nearly all of the respondents discussed the role of curriculum development teams in looking at data and proposing needed changes in a supportive collegial environment. These descriptions also highlight an effective role for the school leader in these team activities; i.e., as group process facilitator as teachers begin to take on the "ownership" of the data.

Curriculum Mapping. One other example of change that occurs as a result of data feedback and group analysis was the curriculum mapping process. While this, too, is a collaborative effort brought about by teams that are examining data, the purpose is more targeted; i.e., looking at the overall curriculum and mapping it to standards and assessment procedures. Two of the teacher leaders mentioned the importance of data gathering and analysis in the curriculum mapping process. They suggested that curriculum mapping is a process that school leaders should understand and experience. One of the teachers described it as follows:

> We're all involved in curriculum mapping. And I will classify that as data because it involves the content of what teachers are doing and types of the activities and the evaluation methods that they're using. This allows teachers to analyze for gaps and repetitions in their curriculum and make sure that students in pre K -16 are receiving a comprehensive complete education without holes and without too many repetitions in it. And that's probably why now we're seeing the stronger type of data available to schools and certain.

Curriculum mapping is certainly a team process that relies on a great deal of data to make decisions about gaps and overlaps in curriculum and links to assessment tools. It is a process that school leaders should be familiar with.

Differentiated Instruction. A number of those interviewed discussed the role of data feedback and analysis as leading to further individualization of teaching as teachers learn more about the strengths and weakness of individual children through the rigorous disaggregation of data. In some cases, the disaggregated information on students may be provided to teachers at the start of school, with the expectations that it will lead to a more targeted approach to teaching individual children. One of the principals described his approach to providing such data back to individual teachers.

> Each teacher at the beginning of the year gets a folder and I've used the Testmate Clarity software to put together. And it has the information on the students that she taught the year before and also the test reports are there for her.....and the same information has also been regrouped for the students that she's getting for this year. Then I sit down with her to see if she has any questions about how to use this. The teacher then takes the objectives under the

different subtests and puts the names of students that she wants to target for those particular objectives based on information in the mastery reports and objective reports. As a principal you always wonder when you go to the trouble of providing information like this will it be used. It is always good to see some evidence that it will be.

Another of the principals described the process by which her entire school had been transformed as Terra Nova testing data have become available. In this small rural elementary school, the Terra Nova information has been used to develop specific interventions for children who are below average in achievement. She describes the transformation as follows:

> We are now concentrating our efforts on the kids performing at the 40th percentile and lower. So we have a list of those kids and we just go in there and analyze the child's performance basically from the information that they [the state] give us. But that's pretty much what we do with that and I mean everything we do is based on that. Everything we do is based on that information – everything. And when we started doing that....that's when we started seeing big increased on Terra Nova scores. We worked just as hard then as we do now but now what we're doing is concentrating on specific areas of need
>
> We now have a file on each of those children. We just started that aspect early this year and we have a file on that child and any interventions that we put like whatever we actually have a list on the folder what areas they are at the 40th percentile or below. Say if it was math then we have on there any interventions that we do in math, like accelerated math. That might be one intervention. We add extra assistant time for that child in math whatever the area of concern is. We even have a tutoring program for school and after school. They automatically go to that program if they're at the 40th percentile or below. This is the first time we've actually pin pointed these kids, wrote down the interventions and what we're going to do with them.
>
> Up until this point what we did was identify an area of need in whatever our school was low in....whether it was language, math, or whatever....and that's kind of how we used it to get to develop our school plan and decide what our areas of need were....but now we're taking it down to an individual basis. We see big results from that and then this year the way the state department has divided up on the web site and stuff we can actually take the special ed.

Clearly, differentiated instruction must be based on data that are analyzed at the level of the individual child. School leaders should be able to disaggregate data so that instructional decisions can be made about individual children.

Setting Financial Priorities. Several of the school principals described the way that the new focus on data-based decision making in schools has impacted the way resources are allocated. Principals indicated that resource allocation questions now are directly tied to the school improvement plan, which in turn is linked directly to data. One principal described how an emphasis on data have

changed the budgeting process in her school:

> Principals also need to look at the resources and how much of the resources are spent on instruction. How much of the resources are spent on our instructional needs ? The best thing that has happened with school improvement is forcing principals to look at these areas for the parents but also having to justify why this was spend here when your school goes over here. How much of what is spent is spent towards your improvement plan – proportionately.

The accountability movement and emphasis on data have clearly impacted how school leaders allocate resources.

Focusing Staff Development. Several principals also discussed the impact that the data driven accountability movement has had on their staff development efforts. It appears that these efforts have become much more targeted and specific, growing directly out of the school improvement plan. One of the elementary principals described the link as follows:

> Everything that we do is supposed to be data driven...research based...so I am not going to send someone to in-service any longer on how to 'reduce stress'. It's great, it's nice, but that's not one of our weak areas. I'm going to send them on how to do improve strategies for reading so that they can perform better on a particular subtest and what those involve.

In the future, it appears that staff development decisions will be even more closely linked to the collection and analysis of data, as reflected in the school improvement plan.

Making Data Public. The importance of good communication emerged repeatedly during the interviews with principals and teacher-leaders, whether the communication was with teachers or parents. A brief summary of each of the recommended data types is presented below.

Presenting Data To Teachers And Facilitating The Work of Teacher Teams. Although some strategies for presenting information to teachers have been presented in other sections of the paper, it is useful to note that in general, principals reported that they often began the school year with a major staff development session in which a presentation was made to the teaching staff on the overall testing scores for the previous year. This often involved a power point presentation that outlined the overall school scores. Principals can use this as a time for teachers to celebrate the good things in the report. One such example was described by a middle school principal. She reported that "we started our day with a power point presentation of our school overall general scores, three year average, percentiles, value added scores – all grade levels, in a none threatening manner, with all teachers there. And it was kind of

a...it was a celebration". As described by a high school teacher, these data feedback sessions can be problematic if not handled with great tact and sensitivity. Her comment is as follows:

> I think you even have to be careful sometimes how you market it [data] within the school and to teachers. People can overemphasize one part....and I've made a mistake of doing that...just saying 'this is it', 'this is what it looks like'...and 'well here we are', and people feel devastated. You see you have to be smarter than that.

Once teachers look at the overall data, they are often broken into subgroups where they are expected to examine the data more closely according to teaching team, grade level or content area. This might occur during the same day during the in-service activity or it could occur over a longer period of time with after school meetings as teachers begin working on the school improvement plan. Principals did report different approaches to working with teaching subgroups. For example, one middle school principal reported that once his teachers began working in subgroups, he "worked with them within as far as they had any specific questions". This principal went on to add, however, that he thought is was better "that they dig a little bit and come up with something on their own". Another high school principal served as a "resource' for her teams. She described with her school improvement planning teams in this way:

> I have to kind of help them figure out what's appropriate in the surveys some times or what kinds of questions we don't want to ask or do want to ask. I approve everything of course that's sent out and I have to help them look at it. I have some people who can do some data analyses, they are often busy with a lot of other things. But there are teachers who help analyze the data. I don't have time to look at that. We don't probably analyze the data to the degree that it ought to be. We kind of work together and come up with a plan, depending on the group, and I try to be there as a substitute or anything. They're willing to work overtime or extra hours because it's reasonable. We finish the work with the written form of the school improvement plan. Data seems pretty new to the people here they haven't looked at test scores too much...that's another kind of data. They haven't looked at transcending data like that before....so that's a kind of learning process. The teacher teams write the reports and then we look at them.....it's a collaborative effort.

There were other principals who provided much more structure to their teacher teams and played a larger role in the process. For example, in one school, principals and central office staff met to discuss the data and identify priorities prior to sharing it with teachers. In that school, the principal felt that teachers had enough other work to do, rather than worrying about spending a great deal of time analyzing test data. As one principal described it:

> The teachers have enough on their plates right now. I think we need to give them a Cliff's Notes version on test information because if they can actually see at a glance this is where they will work at a problem in a classroom. And here are a list of skills that my children are

> not doing well and if they can recognize those two things. I think that's enough for a teacher. If you get too much data then you really get bombarded and you can't make good decisions. You may get so much that you don't know what to use... and that's what happens to teachers when you give them too much of that.

There was one other principal who shared this same view. Another middle school principal described the difficulty in trying to present value-added scores to the community and faculty. She described her dilemma this way:

> I use lots of different data. I think in today's world with the accountability we have in public education ..you're forced to – you have to you know...it comes out in the media, it comes out in the report card from the state department with your school's name on it labeled A, B, C, D, F and value added scores...and that goes to our public, and so you have to understand what that means, where the scores came from, and how to explain that to your faculty and keep them around and their focus where it needs to be. [if not presented properly] the teachers just will give up because they think...I'm a terrible teacher. So you have to keep it with focus and prospective. But.....percentiles are very important in understanding that and those come out first and typically our system does extremely well with percentiles. Value added stinks.

It appears then, that there is quite a bit of variation in the amount of data that are shared with teachers. In most of the schools represented in this study, principals served as facilitators who provided the data and let teacher teams "struggle" with analysis and interpretation. In other schools the principal acted as more of a hands on resource person or consultant. In a few schools, the principals tried to keep the teachers from having to take on a lot of the data analysis responsibility.

Developing A Sense of Teacher Ownership. As developed in other sections of this paper, teacher ownership did seem to be important in translating data into instructional improvement and curriculum change. This was accomplished as teachers worked with the disaggregated data in small groups and identified priorities in grade-levels or content areas. According to one of the elementary school principals, she tries to support the priorities that these small teacher teams come up with because "they're going to implement it better if it comes from them rather than if it comes from me". The interviews seemed to indicate that there were some schools in which this was not happening at the same rate.

Sharing Information With Parents. Many of the teacher-leaders in this study identified the importance of being able to communicate data to parents of children, whether those data were based on standardized testing information or more qualitative or anecdotal in nature. Most of the comments about

presenting data to parent occurred among teachers in the elementary grades. For example, one elementary school teacher described the importance of sharing performance data to parents, in addition to test score results, so that they might see a broader picture of the student's performance. She described it this way: "Now I have found that in a conference....that was one of the biggest things I found.....that referring to these notes was so much more powerful than referring to a 98, a 54. I did feel that I brought parents along in my direction once I had shown them an actual piece of work compared to a piece of work from a week later or a year later and to talk about the child's growth or the child's difficulties". Another elementary school teacher described her efforts to share data in a meaningful way with parents as follows:

> One thing that I do is that I meet with parents and for children especially in multiage situations which I am, in PreK through 2...this is important. So I use a variety of checklists of reading and writing skills. And I have some good forms that serve the pre K through the second grade and as you know children grow up at such different rates but it's a good scale. It puts it in terms that parents can understand. So that they can understand that kids can develop within that range at any time. So I have some good check lists that I use that I keep track of the kids throughout the year. And I actually just do those. They have it as a monthly checklist. I do that about every other month, because I do other things with reading such a variety of forms of instruction. So I – to keep the parents in touch, we have a weekly reading note books that I write in and keep information in regards to the lessons for me and the parents. Then parents can respond and have their own views on how the children are doing.

One of the principals from the middle school level noted the importance of being able to explain data, particularly TN Report Card scores, very clearly to parents. She described dilemma as follows:

> You have to be able to talk to your parents the report card data because it comes out in letter grades A through F. And we're so engrained in education that a C is average and F is failing but one year's growth in value added is a 100%. We're supposed to grow children one year that's a 100% and that's what we're trying to do but the state gives that a letter grade of a C. We ought to have an A on that report card that goes to the public. You have to have 115% or better. When that comes out the parents see a C which we're thrilled with ... the 100% ....they think they've averaged .....and a D and an F.....you might have a D and have 95% value added growth but you got a D. So you have to be able to explain that to your parents and to your public and make them understand You may have to call parent meetings or discuss it at the soccer park or the ball games or wherever they are, or they may come in one on one.

School leaders must be very cognizant of the need to communicate data to parents in a way that they will understand and they must do this with great sensitivity,

Accountability Issues. Interviewees also suggested that school leaders (both principals and teacher-leaders) should be expected to have an understanding of current state and national issues related to

educational data and its use. While the respondents felt that it was a bigger part of the principals role to be up-to-date on state and federal laws and policy, all of them felt that teacher-leaders, too, should be aware. The comments are organized around the three strands that are presented below:

Federal Law. Nearly all of the interviewees in one way or another described that importance of keeping abreast of federal laws that might have an impact on the nature of the types of data that are used in schools. The generally held view was that principals were required to take a more global view than teachers and were probably more familiar with federal legislation, although it was important for teachers to at least be aware of. One of the teachers described how important is was to be kept informed:

> I find that teachers are not aware of federal legislation. We're not disseminating that information to them in a way that is either readable, understandable or I don't know.....but I just met a few moments ago with teachers and a question was asked and the answer came straight from 'No Child Left Behind'. And they were so interested in that and it was like 'oh you're kidding – that explains it all'. So I have to know that law.

Several of the principals noted that they made special efforts to make sure that any legislative information that came to them was passed along to teachers via email, if it was deemed relevant. As one of the principals stated it, "they can't get away from it.....they are going to hear it everywhere they turn they will have opportunities to be saturated with it. No one is ever going to know everything about it...but they need to know the basics."

State Law and Policy. The principals and teacher-leaders were even more convinced that school leaders need to be aware of state law and policy that related to the collection of data in schools. There was complete agreement that school leaders should understand the educational accountability in Tennessee. One of the principals from a small rural high school noted that it was important for teachers in her school system be aware of Tennessee legislation because it they had a direct interest in it. As she described it:

> I told the teachers, remember when we got more money in 19—whatever it was 1992 or 1993 when they did the BEP? They said that we were going to be accountable for a period years. You know everybody thought that will go away but it didn't. You need to pay attention what happens in legislation because they make some key decisions that are fixed.

One of the teacher-leaders expressed the opinion that school leaders might also benefit from a study of the history of the educational accountability movement in Tennessee. Her comments were as follows:

> I think it helps [understanding history] to understand where you are today. But I know there would be 99% who do not agree with this and who would ask, 'why do I need to know that?' ...that would be the comment that you hear. When you do move to where you can see a slightly bigger data picture and where can you have a full understanding of what has come before you I think you can do a better job with what you do today.

The respondents all agreed that principals and teacher-leaders should all have a good understanding of the legislation that was being developed in Nashville and the possible implications of that legislation for their schools.

Politics of Accountability. Two teachers discussed the importance of school leaders not only becoming knowledgeable about legislation impacting public education, but also becoming more politically active. For example, one of the early childhood teachers suggested that teachers needed to become more involved. As she put it:

> I've had to become a little bit more politically savvy knowing what's going on because it directly affects us. I used to think that with all that politics it really didn't matter...but I really do think it does. I think that – you know – I'm just seeing the picture....they're mandating testing down to kindergarten. And you know and I feel like I need to have a voice to kind of help stop that. But I really do – I think you have to be – you know you have to be a speaker and I don't – because I bet that's not my cup of tea.... it's not what I have knowledge about... .. but I've got to be up on that and voice my opinion and have statistics to go with that too.

While this was not discussed by the majority of those who where interviewed, it was mentioned by those teaching in the early elementary school situation, who seemed to be looking for ways to keep the standardized testing movement from working its way down into the first and second grade levels.

Research Question #3

The third research question was: "*What type of learning experiences would enable participants in principal preparation programs to develop this knowledge and related skills*?". There was a great deal of similarity in participant responses related to this question. These responses resulted on the development the two major thematic statements that are presented below.

Theme 1: When designing a principal preparation program, data analysis activities should be "authentic" and involve working with real data from the participant's own school.

The interviewees were all quite consistent in stating that any data-related activities in the principal preparation program should be hands-on and as "authentic" as possible. These school leaders indicated that participants in the program should be allowed to work with simulated data sets, although if possible, the learning experience would be enhanced if they could use real data from their own schools. Participants suggested that the educational experiences be directly related to data focused tasks faced on the job; i.e., working with school improvement planning committees, writing the school improvement plan, conducting parent surveys, etc. This message was heard in nearly all of the interviews. While several of the those interviewed suggested that "simulated" school data could be useful, nearly all agreed that the optimum learning environment would include the opportunity to conduct analysis on actual school data, from the participants home school. The responses implied that perhaps the programmatic assignments and activities could be structured to compliment "on the job" activities. Several of the interviewees suggested that all data-related activities in the preparation program could be tied in some way to the school improvement planning process and that the sequence of activities should follow the actual sequence of activities in the planning process. As one elementary school principal put it, "I think they have to get in there and get their hands dirty with it [data]. They need to look at the real stuff and the real formats. That is very important....that the formats they are working with are identical to those presented to them". Another elementary principal saw "authentic" data analysis exercises as critical to learning the process of data analysis. She suggested that, "unless you are working with the actual application that you'd be using, it is difficult to bridge the gap between theory and the application". The message was very clear; when working to gain any of the knowledge or skills presented above, the principal preparation program must engage the participants in a study of their classrooms or schools. In a sense, their suggestions implied that while in the preparation program, participants' places of work should be viewed as a data analysis laboratory, in which ideas and concepts from the program are "tried out" back at the school and also where the hands-on experiences from school are brought back to the preparation program as stimuli for future discussion and further learning.

Theme 2: While data-related technology skills should be taught in principal preparation program, these skills should be more general, rather than specific.

While there were a number of suggestions as to what types of data-related technology skills should be taught in principal preparation program, there was a clear underlying message; it is better to be more general rather than specific. Nearly all of the school principals suggested that those in principal preparation programs learn to use basic multipurpose computer software and most recommended Microsoft Office 2000. As one principal noted, "Quite honestly, if they just had a good knowledge of the components of Microsoft Office, they probably would be able to do everything that they would need to do from the spreadsheets, to budgeting, to data analysis, and even Powerpoint presentations if they wanted to. It is the standard. Everyone has it and using it effectively is the key". Nearly all participants suggested that Microsoft Word is almost indispensable as a leadership tool. Several respondents recommended the use of Excel for keeping small databases and for keeping grades. Others reported that Powerpoint was an excellent tool for communicating data to others. One high school principal justified the use of Microsoft Office because of its universality and standardized nature.

Several of the principals and teachers suggested that there really was no need to learn to analyze their own classroom or school data using the Testmate Clarity software, since the state and central office provide those data to the schools. They did not see that this should be a part of the principal preparation program. They seemed to be very satisfied with the data that were being prepared for them. One of the teachers summed it up this way:

> The Terra Nova data comes broken down to me so I don't have to know how to do that. This works well for me. If you can have someone else do something for you, that just gives you more time to reflect on the data. We have to be real here. There are only 24 hours in a day and it is going to keep doing that! So you have to use all your resources. So it just works better if someone provides that for me.

One of the principals from a school system in which principals were required to perform their own analysis of standardized testing data, had a very different response to this question. He suggested that leaders need to be able to analyze the data from their schools, since it would help them have greater "ownership" in the process. He summed it up as follows:

> I would love to have a resource to call on [when analyzing my data] but I would not want it to be set up so that I or other principals could use that as a crutch. In the same way as I was

> talking about teachers needing to have ownership of data – well a principal does too. And I can see that if they do not have to worry about their own data…well I'll say outright…..principals, with all the other demands that are going on, could easily fall into that trap of not really understanding the data or how it was analyzed…..and they would just go on.

That particular principal felt that leaders should learn to use the Testmate Clarity software and to perform the analysis of their own data.

Six of those interviewed discussed the importance of understanding all of the standardized testing data that are now available on the State Department of Education website. These leaders suggested that in a preparation program, participants learn to use this particular resource for data. One of the teachers stated the importance of accessing data via the internet as follows: "If you want to look at standardized testing information, you've got to be able to use the internet because that is where the data are stored, at the state website. They store data for the TCAP, SAT, and ACT and Tennessee Report Card. So this site is very important."

While there were repeated references made to the several student information management software packages that are used by the schools in Tennessee and the useful data that are generated from the software, principals did not see this as being something that should be developed in a principal preparation program. As one principal noted, the student information management software is critical to the principal in his or her job, but it should not be addressed in preparation programs because, "it is such an easy to use program and easy to understand, there is no need. By the time you taught [participants] how to use it, it is going to be out of a date or a new one will have been adopted. We change every three years". Since the programs changed so frequently and they were relatively easy to learn and use quickly, these leaders did not see this as something that should be a priority in preparation programs.

Two principals suggested that while in preparation programs, future leaders needed to gain exposure to several of the more commonly used computerized assessment programs on the market and be asked to use these assessment tools in generating data about children in their classrooms.

In addition to identifying the needs mentioned above, the teachers identified other technology needs that were more focused on improving direct classroom instruction. Three teachers identified the importance of email and web pages as sources of communication between teachers and parents, and felt

that school leaders needed to know how to use these internet resources to improve communication. One teacher suggested using forms pages from Microsoft Frontpage to create online surveys that could be send to parents on a regular basis. Two other teachers reported that leaders need to be able to access other information off the internet that might be of assistance in generating or working with data. For example, she recommended the utility of http://www.rubristar.com as a website that can assist teachers in writing rubrics.

One teacher-leader who felt that in the future school leaders would be called upon to do more curriculum mapping and felt that while in preparation programs, participants should be exposed to the curriculum mapping software that is beginning to emerge. Two other teacher-leaders noted that with the emphasis on observational data and authentic assessments, participants in preparation programs should be introduced to software available to generate electronic portfolios. Nearly all the teachers discussed the important of having some electronic means of keeping grades and records of student performances, if not through the Microsoft Office software, then through more specific electronic grade book programs. In describing the kinds of technology that should be incorporated into leadership preparation programs, principals were more focused on technology that could be used for the entire school, whereas teacher-leaders were more focused on classroom applications.

Summary and Conclusions

In this study three general research questions were addressed, with the hope of finding answers that would aid in the development of a new data analysis strand that will be part of a redesigned Masters Degree Program in Educational Leadership at East Tennessee State University. In response to the first research question, it appears that there is great similarity in the data-related knowledge and skills needed by principals and teacher-leaders in our schools. Respondents in this study were in agreement that the two groups needed to cultivate the same knowledge and skill while in preparation programs. In practice, the same knowledge and skills are necessary, although at any one time principals and teacher-leaders might draw upon different areas of knowledge or exhibit different skills. These findings are significant, since historically teacher-leaders were trained separately from school principals in Colleges of Education.

These findings suggest that perhaps those in teacher-leadership and principal preparation programs could engage in the same or overlapping learning activities related to data analysis. Perhaps there is a need to look at more integrated curricular approaches to the preparation of principals and teacher-leaders. Maybe their roles are not as different as we often think they are.

In response to the second research question, the results suggest that the knowledge and skills required by successful school leaders are aligned around seven primary areas: 1) The School Improvement Process, 2) Types of Assessment Data, 3) Managing Data, 4) Analyzing Data and Data Quality, 5) Using Data To Improve Teaching and Learning, 6) Making Data Public, and 7) Accountability Issues. Within each of these seven primary areas there are a number of more specific clusters of knowledge and skill that school leaders should possess. These will be the focus of the redesigned program. It is hoped that the knowledge and skills identified in this study can be used by program developers to structure learning experiences for those enrolled in the new preparation program. It appears that many of the activities that underlie the required knowledge and skills can be conducted in the field setting and that many of them can be ordered sequentially over time. Many of the activities will occur at the participant's work place. Departmental courses will be designed as seminars that supplement, rather than supercede, an extensive "on-site" mentoring process. It is our hope that the new principal preparation program will be structured around the more specific tasks identified in the workplace and that much of the instructional/learning activities will take place in the participants' schools; for example, in the future it is clear that much more effort needs to be placed on the interpretation of standardized testing information and how those data might be translated into better instruction. It may be that there is a need to reduce, significantly, a focus on the statistical analysis of data and the generation of reports, since much of the data are already provided for the school leaders.

In response to the third research question, it appears that the major criterion for a successful new preparation program, specifically the strand that prepares leaders to work with data, is that the activities designed to impart knowledge and skills are authentic in nature and allow the participants to use their place of work as a laboratory. Participants should be allowed to use work-related activities in

completing the preparation program. For example, activities should be developed around the seasonal "data work cyle" that seems to center around the return of standardized test scores, the start of school, surveying of parents, students, and staff, and the development of school improvement plans. Such an approach would enable participants to more effectively bridge the theory of leadership to school practice.

Finally, it is hoped that the findings from this qualitative investigation will assist others who may be attempting to construct a more "authentic" principal preparation program, particularly in that strand of the program that is focused on the data-related knowledge and skills identified necessary to perform successfully as leaders in today's schools.

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Appendix A
Initial Interview Schedules

Principal Interview Guide

1. Tell me about the ways in which you work with data as principal of your school ? In what ways do you use data to improve your practice ? Try to think very broadly about the term data, and describe a variety of ways that data are used by principals.

2. Please describe ways that teacher-leaders in your school work with data ? In what ways do your teacher-leaders use data to improve their practice ? Again, try to think very broadly about the data and describe a variety of ways that data are used by teacher-leaders in your school.

3. In what ways could you make better use of data ? What would you have to know more about in order to do that ?

4. In what ways could your teachers or teacher-leaders make better use of data ? What would they have to know more about in order to do that ?

5. What knowledge and/or specific skills do you think need to be taught in preparation programs for school principals that would enable them to use data more effectively ? Can you describe a range of knowledge and skills that would be helpful for principals to have ? *[Note to interviewer: At this point you might want to offer a few suggestions that show a range of possible skills; for example, you might consider such skills as the ability to organize staff members into school improvement teams, design survey materials, conduct statistical analyses, communicate findings to audiences, or write summary reports using data. You might even need background knowledge on the school improvement process, history of assessment movement in Tennessee, or knowledge of measurement concepts]*

6. What knowledge and/or specific skills do you think need to be taught in preparation programs for teacher-leaders that would enable them to use data more effectively ? Can you describe a range of knowledge and skills that would be helpful for teacher-leaders to have ? *[Note to interviewer: At this point you might want to offer a few suggestions that show a range of possible skills; for example, you might consider such skills as the ability to organize staff members into school improvement teams, design survey materials, conduct statistical analyses, communicate findings to audiences, or write summary reports using data. You might even need background knowledge on the school improvement process, history of assessment movement in Tennessee, or knowledge of measurement concepts]*

7. What technological knowledge and/or skill, if any, might help teachers-leaders and principals use data more effectively in schools ?

8. Please share any other suggestions that you might have that would lead to the increased use of data as an aid in decision-making in schools.

Thank You !

Teacher Interview Guide

1. Can you tell me about the ways in which you work with data as a teacher-leader in your school ? In what ways do you use data to improve your practice ? Try to think very broadly about the term data, and describe a variety of ways that data are used by teacher-leaders.

2. Can you describe ways that your school principal works with data ? In what ways does your principal use data to improve your practice ? Again, try to think very broadly about the data and describe a variety of ways that data are used by your principal.

3. In what ways could you make better use of data ? What would you have to know more about in order to do that ?

4. In what ways could your school principal make better use of data ? What would he or she have to know more about in order to do that ?

5. What knowledge and/or specific skills do you think need to be taught in preparation programs for teachers that would enable them to use data more effectively ? Can you describe a range of knowledge and skills that would be helpful for teacher-leaders to have ? *[Note to interviewer: At this point you might want to offer a few suggestions that show a range of possible skills; for example, you might consider such skills as the ability to organize staff members into school improvement teams, design survey materials, conduct statistical analyses, communicate findings to audiences, or write summary reports using data. You might even need background knowledge on the school improvement process, history of assessment movement in Tennessee, or knowledge of measurement concepts]*

6. What knowledge and/or specific skills do you think need to be taught in preparation programs for school principals that would enable them to use data more effectively ? Can you describe a range of knowledge and skills that would be helpful for principals to have ? *[Note to interviewer: At this point you might want to offer a few suggestions that show a range of possible skills; for example, you might consider such skills as the ability to organize staff members into school improvement teams, design survey materials, conduct statistical analyses, communicate findings to audiences, or write summary reports using data. You might even need background knowledge on the school improvement process, history of assessment movement in Tennessee, or knowledge of measurement concepts]*

7. What technological knowledge and/or skill, if any, might help teachers-leaders and principals use data more effectively in schools ?

8. Please share any other suggestions that you might have that would lead to the increased use of data as an aid in decision-making in schools.

Thank You !

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